

## NATURAL RESOURCES CONSERVATION SERVICE CONSERVATION PRACTICE STANDARD

### MANURE TRANSFER

(No.)

CODE 634

#### DEFINITION

A manure conveyance system using structures, conduits, or equipment.

#### PURPOSE

To transfer animal manure (bedding material, spilled feed, process and wash water, and other residues associated with animal production may be included) through a hopper or reception pit, a pump (if applicable), and a conduit to;

a manure storage/treatment facility,

- a loading area, and
- to agricultural land for final utilization. This includes application of manure to the utilization area.

#### CONDITIONS WHERE PRACTICE APPLIES

The manure transfer component is a part of a planned agricultural manure management system.

Where manure is generated by livestock production or processing; and a conveyance system is necessary to transfer manure from the source to a storage/treatment facility and/or a loading area, and/or from storage/treatment to an area for utilization.

#### CRITERIA

##### Criteria for all purposes

Manure transfer components shall comply with all federal, state, and local laws, rules and regulations.

Structures - All structures, including those which provide a work area around pumps, will be designed to withstand the anticipated static and dynamic loading. The structure shall withstand earth and hydrostatic loading in accordance with Practice Standard 313, Waste Storage Facility. The minimum thickness of component elements of concrete structures shall also be in accordance with Practice Standard 313. When needed, covers shall be designed to support the anticipated dead and live loads.

Reception pits shall be sized to contain one full days manure production.

Openings to structures to receive manure from alley scrape collection shall be a minimum of 9 square feet with one dimension no smaller than 4 feet. The opening shall be equipped with a grate designed to support the anticipated loads.

When curbs are needed in conjunction with structures, they shall be constructed of either concrete or wood. Curbs shall be of sufficient height to insure total manure flow into the structure and be adequately anchored.

Pipelines - Design of pipelines shall be in accordance with Practice Standard 430, Irrigation Water Conveyance, except that high density polyethylene (HDPE) pipe may be designed for above ground installation. HDPE pipe shall conform to either ASTM F 714 "Polyethylene Plastic Pipe Based on Outside Diameter", or F 771 "Polyethylene Thermoplastic High-Pressure Irrigation Pipeline Systems". The minimum pipeline capacity from collection facilities to storage/treatment facilities shall be the maximum flow anticipated on a daily basis. The minimum pipeline capacity from storage/treatment facilities to utilization areas shall insure the

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storage/treatment facilities can be emptied within the time limits stated in the management plan for manure utilization. Pipelines shall be designed to have a minimum of 2 feet per second and a maximum of 6 feet per second velocity except where ruminant manure is transferred in a gravity system; in which case velocities can be reduced if a minimum of 5 feet of head is provided on the pipe system.

HDPE pipe above ground designs shall be limited to sites where soils are shallow to rock. Designs shall include provisions for the placement of the pipe on saddles or earth pads and anchorage of the pipe to accommodate thermal expansion and contraction. The design shall provide for the thermal expansion-contraction of the pipe for the maximum variation in temperature that can be expected from winter to summer, the coefficient for linear thermal expansion shall be a minimum of  $1.2 \times 10^{-4}$  inch/inch/ degree Fahrenheit temperature change. Pipe support saddles shall have a bearing length in the longitudinal direction of the pipe of no less than one-half the pipe outside diameter. The support shall as a minimum cradle the bottom one-third of the pipe circumference. Earth pads for HDPE pipe shall be a minimum of 6 inches thick and be comprised of materials with a maximum particle size of 1 inch in diameter. Particles shall be rounded with no sharp faces.

Clean-out access shall be provided for gravity pipelines at a maximum interval of 200 feet for lines carrying non-bedded manure. For pipelines carrying bedded manure the maximum interval shall be 150 feet. Gravity pipelines shall not have horizontal curves or bends except minor deflections (less than 10 degrees) in the pipe joints unless special design considerations are used.

Other Conveyances - Concrete lined ditches shall be designed in accordance with Practice Standard 428A, Irrigation Water Conveyance-Non-reinforced Concrete Ditch and Canal Lining. A minimum design velocity of 1.5 feet per second shall be used.

Earth ditches shall meet the applicable soil texture/seepage design criteria for earthen waste storage facilities as specified in Practice Standard 313, Waste Storage Facility.

Pumps - Pumps installed for manure transfer shall meet the requirements of Practice Standard 533, Pumping Plant for Water Control. Pumps shall be sized to transfer manure at required system head and volume. Type of pump shall be based on the consistency of manure. Consideration for pump installations shall be based on manufacturer's recommendations.

Safety - The system design shall consider the safety of humans and animals during construction and operation.

Open structures shall be provided with covers or barriers such as gates, fences, etc. Ventilation and warning signs shall be provided for manure transfer systems as necessary to warn of the danger of entry and to reduce the risk of explosion, poisoning, or asphyxiation.

Pipelines from enclosed buildings shall be provided with a water-sealed trap and vent or similar devices where necessary to control gas entry into buildings.

Gravity discharge pipes used for emptying a storage/treatment facility shall have a minimum of two gates or valves, one of which shall be manually operated.

Tractors or other vehicles used to tow manure spreaders or tank wagons shall be sized to reduce the danger of roll-over.

#### Criteria in support of the purpose of land application

Manure shall be applied to the utilization area in amounts and at a time consistent with the manure management plan and Practice Standard 590, Nutrient Management or 633, Waste Utilization as appropriate

Sprinklers or sprinkler systems shall be designed in accordance with Practice Standard 442, Irrigation System, Sprinkler. Sprinkler system design capacity shall be adequate to apply the required volume of manure at a rate and uniformity that shall prevent runoff and meet the nutrient needs of the plants. Nozzle size shall be appropriate for the consistency of the manure applied. Sprinkler applied, manure contaminated water, shall normally contain less than two percent solids unless provisions are made for straining or filtering before application.

Manure spreaders and/or tank wagons shall have adequate capacity to insure the emptying of storage/treatment facilities within appropriate time periods as stated in the system operation and maintenance plan.

Gated pipe and other appurtenances used in conjunction with gravity application shall be designed to insure uniform application amounts.

## **CONSIDERATIONS**

Utilization of topography to generate head to reduce pumping requirements;

Economics (including design life), overall manure management system plans, and health and safety factors;

Possible contamination of domestic water systems and ground water;

Loading and unloading of equipment in the vicinity of the manure transfer components;

Subsurface conditions, i.e., depth to bedrock, water table, etc.;

When applicable, compatibility to joint use of manure transfer with irrigation system design requirements;

System for flushing pipelines with clean water;

Provisions for cleaning out solids deposition in ditches;

Pipe pressure rating adjustments required based on manure temperature;

Corrosion resistance and water tightness in the selection of pipe material and joints;

Need for appropriate check valves, anti-siphon protection and open air breaks;

Sanitation needs of all conveyance equipment that leaves the farm in order to prevent the spread of disease;

Potential for salt (struvite) deposits in smaller diameter pipe.

Consider potential hazard from fire, surface load impacts, abrasion, etc. for above ground conveyance pipelines.

## **PLANS AND SPECIFICATIONS**

Plans and specifications for installing manure transfer systems shall be in accordance with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

## **OPERATION AND MAINTENANCE**

Operation and maintenance shall be in accordance with the requirements specified in the overall operation and maintenance plan required by the applicable Practice Standard 313, Waste Storage Facility, or 359, Waste Treatment Lagoon.